

REMARKS

The Applicant respectfully requests further examination and consideration in view of the amendments above and the arguments set forth fully below. Prior to this Office Action, Claims 1-39 were pending in this application. Within the Office Action, Claims 1-39 are rejected. By the above amendments, Claims 1, 14, and 27 are amended. Accordingly, Claims 1-39 are currently pending in this application.

Rejections Under 35 U.S.C. § 112

Within the Office Action, Claims 14-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Specifically, it is stated that Claim 14 includes an error wherein the phrase “each on of a plurality” needs to be corrected as “each one of a plurality”. By the above amendment, Claim 14 is amended to replace “each on of a plurality” with “each one of a plurality”.

Rejections Under 35 U.S.C. § 102

Within the Office Action, Claims 1, 14, and 27 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,114,968 to Ramakrishnan et al. (hereinafter “Ramakrishnan”). The Applicant respectfully traverses these rejections.

Ramakrishnan teaches a shared medium network 100 including a plurality of access interface units (AIUs) 120, also referred to as MAC users, coupled to a headend unit 110 via a shared channel 130. A contention/polling technique is described in which “active” MAC users are given contention-free access to the shared channel 130 by individually addressed poll messages, and “inactive” MAC users are provided opportunities to contend for access to the channel. The headend unit 110 characterizes each MAC user as either “active” or “inactive” based on the MAC user’s responses to poll messages. The headend unit 110 maintains a list of the active MAC users, referred to as the “select poll list”, and a list of the inactive MAC users, referred to as the “contention poll list”. The MAC users on the select poll list are polled individually. The MAC users on the contention poll list are “routinely” polled in groups and must contend for access to the shared channel. In other words, the group of MAC users in the active list utilize the polling technique, and the group of MAC users in the inactive list utilize the contention technique. Therefore, only the inactive group utilizes the contention technique, the

active group does not utilize the contention technique. In summary, Ramakrishnan does not teach that all groups utilize the contention technique.

Further, Ramakrishnan teaches that the inactive group of MAC users on the contention poll list are sent a group addressed poll message, referred to as a limited contention poll (LCPoll). MAC users in the inactive group can respond to the LCPoll by transmitting a reservation request message. If more than one MAC user responds to the LCPoll, then a collision occurs, and the headend unit 110 must resolve the collision. Ramakrishnan teaches that this collision resolution is performed by “sending LCPolls to successively smaller and smaller subgroups until each MAC user having data to transmit is able to make a reservation.” It is not clear what “smaller and smaller subgroups” specifically refers to. For example, are all MAC users in the inactive group split into multiple subgroups, and if so how many subgroups? Are only the MAC users that respond to the LCPoll split into subgroups of responding MAC users? If one or more subgroups subsequently encounter another collision, are all, some, or only one of the subgroups further split? There are advantages and disadvantages to any such techniques used for collision resolution, and as such, it is not obvious which techniques of sub-grouping would or could be utilized. Ramakrishnan is silent as to how successive smaller and smaller subgroups are formed. Ramakrishnan does not teach that if a collision occurs within a specific subgroup, the specific subgroup that experiences the collision is split into smaller subgroups.

In contrast to the teachings of Ramakrishnan, the present invention teaches a polling mode, a contention mode, and a seamless transition between the polling and contention modes to coordinate user transmissions. Each of a plurality of users is assigned an address from a pool of available addresses. The entire user group is then split into organizational subgroups and only users belonging to a specific subgroup at any transmission opportunity are allowed to transmit. Each subgroup is systematically polled to provide each group with a transmission opportunity. In other words, each of the subgroups is polled, and during the transmission opportunity for the specific subgroup, each of the users assigned to the specific subgroup can request to transmit, as in a contention mode. If a collision occurs within the specific subgroup, the specific subgroup is split into smaller subgroups, where each smaller subgroup also utilizes a contention mode. The smaller subgroups in which collisions are detected will continue to split until no collisions occur.

The amended independent Claim 1 is directed to a method of coordinating slotted multiple access in a wireless network channel shared by a plurality of users. The method comprises the steps of assigning each of a plurality of users into a subgroup, thereby forming one

or more subgroups of users, wherein each subgroup utilizes a contention mode, utilizing a polling mode to provide each subgroup a transmission opportunity, and utilizing a seamless transition between the polling and contention modes such that when a specific subgroup is provided a transmission opportunity and a collision occurs between user signals within the specific subgroup, the specific subgroup is split into smaller subgroups, each smaller subgroup including a portion of the users within the specific subgroup and each smaller subgroup utilizes a contention mode. As discussed above, Ramakrishnan does not teach that all groups utilize the contention mode. Further, Ramakrishnan does not teach that if a collision occurs within a specific subgroup, the specific subgroup that experiences the collision is split into smaller subgroups, where each smaller subgroup also utilizes a contention mode. For at least these reasons, the independent Claim 1 is allowable over Ramakrishnan.

The amended independent Claim 14 is directed to an apparatus for coordinating slotted multiple access in a wireless network channel shared by a plurality of users. The apparatus comprises means for assigning each one of a plurality of users into a subgroup, thereby forming one or more subgroups of users, means for implementing a polling mode to provide each subgroup a transmission opportunity, means for implementing a contention mode within each subgroup, and means for providing a seamless transition between the polling and contention modes such that when a specific subgroup is provided a transmission opportunity and a collision occurs between user signals within the specific subgroup, the specific subgroup is split into smaller subgroups, each smaller subgroup including a portion of the users within the specific subgroup and each smaller subgroup utilizes a contention mode. As discussed above, Ramakrishnan does not teach that all groups utilize the contention mode. Further, Ramakrishnan does not teach that if a collision occurs within a specific subgroup, the specific subgroup that experiences the collision is split into smaller subgroups, where each smaller subgroup also utilizes a contention mode. For at least these reasons, the independent Claim 14 is allowable over Ramakrishnan.

The amended independent Claim 27 is directed to an apparatus for coordinating slotted multiple access in a wireless network channel shared by a plurality of users. The apparatus comprises an ATM cube for operating a high speed wireless network consisting of a plurality of horizontal and vertical management layers, a hub for transmitting and receiving wireless network signals such that the hub may receive requests and assign portions of a communication bandwidth, and a plurality of end user nodes for transmitting and receiving wireless network signals such that a plurality of users may request or be granted a portion of the communication

bandwidth, wherein the hub assigns each one of the plurality of users into a subgroup that utilizes a contention mode, and when a specific subgroup is provided a transmission opportunity according to a polling mode and a collision occurs between user signals within the specific subgroup, the hub splits the specific subgroup into smaller subgroups, each smaller subgroup including a portion of the users within the specific subgroup and each smaller subgroup utilizes a contention mode. As discussed above, Ramakrishnan does not teach that all groups utilize the contention mode. Further, Ramakrishnan does not teach that if a collision occurs within a specific subgroup, the specific subgroup that experiences the collision is split into smaller subgroups, where each smaller subgroup also utilizes a contention mode. For at least these reasons, the independent Claim 27 is allowable over Ramakrishnan.

Rejections Under 35 U.S.C. § 103

Within the Office Action, Claim 27 is rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,198,728 issued to Hulyalkar et al. (hereinafter “Hulyalkar”) in view of Ramakrishnan. The Applicant respectfully traverses this rejection.

Within the Office Action, it is acknowledged that Hulyalkar does not teach a hub that assigns each one of the plurality of users into a subgroup that utilizes a contention mode, and when a specific subgroup is provided a transmission opportunity according to a polling mode and a collision occurs between user signals within the specific subgroup, the hub splits the specific subgroup into smaller subgroups, each smaller subgroup including a portion of the users within the specific subgroup. It is also stated within the Office Action that Ramakrishnan does teach a hub that assigns each one of the plurality of users into a subgroup that utilizes a contention mode, and when a specific subgroup is provided a transmission opportunity according to a polling mode and a collision occurs between user signals within the specific subgroup, the hub splits the specific subgroup into smaller subgroups, each smaller subgroup including a portion of the users within the specific subgroup. However, as discussed above in regards to Claims 1, 14, and 27, Ramakrishnan does not teach that each subgroup utilizes a contention mode, and Ramakrishnan does not teach that if a collision occurs within a specific subgroup, then the specific subgroup is split again into smaller subgroups, where each smaller subgroup also utilizes a contention mode. Therefore, neither Hulyalkar, Ramakrishnan, nor their combination teach splitting a subgroup of users into subgroups where each subgroup utilizes a contention mode. Further, neither Hulyalkar, Ramakrishnan, nor their combination teach that if a collision occurs within a specific

subgroup, then the specific subgroup is split again into smaller subgroups, where each smaller subgroup also utilizes a contention mode.

The amended independent Claim 27 is directed to an apparatus for coordinating slotted multiple access in a wireless network channel shared by a plurality of users. The apparatus comprises an ATM cube for operating a high speed wireless network consisting of a plurality of horizontal and vertical management layers, a hub for transmitting and receiving wireless network signals such that the hub may receive requests and assign portions of a communication bandwidth, and a plurality of end user nodes for transmitting and receiving wireless network signals such that a plurality of users may request or be granted a portion of the communication bandwidth, wherein the hub assigns each one of the plurality of users into a subgroup that utilizes a contention mode, and when a specific subgroup is provided a transmission opportunity according to a polling mode and a collision occurs between user signals within the specific subgroup, the hub splits the specific subgroup into smaller subgroups, each smaller subgroup including a portion of the users within the specific subgroup and each smaller subgroup utilizes a contention mode. As discussed above, neither Hulyalkar, Ramakrishnan, nor their combination teach splitting a subgroup of users into subgroups where each subgroup utilizes a contention mode. Further, neither Hulyalkar, Ramakrishnan, nor their combination teach that if a collision occurs within a specific subgroup, then the specific subgroup is split again into smaller subgroups, where each smaller subgroup also utilizes a contention mode. For at least these reasons, the independent Claim 27 is allowable over Hulyalkar, Ramakrishnan, and their combination.

Within the Office Action, Claims 2-9 and 15-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ramakrishnan in view of U.S. Patent No. 4,071,908 to Brophy et al. The Applicant respectfully traverses these rejections.

Claims 2-9 are dependent on independent Claim 1. Claims 15-22 are dependent on independent Claim 14. As stated above, Claims 1 and 14 are in a condition for allowance. Accordingly, Claims 2-9 and 15-22 are also in a condition for allowance.

Within the Office Action, Claims 10-13 and 23-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ramakrishnan in view of U.S. Patent No. 5,892,769 to Lee. The Applicant respectfully traverses these rejections.

Within the Office Action, Claims 28-35 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ramakrishnan in view of Brophy. The Applicant respectfully traverses these rejections.

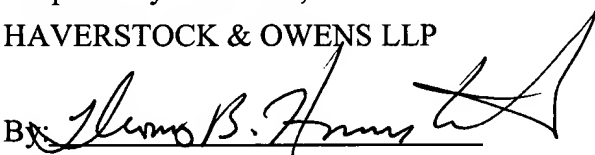
Claims 28-35 are dependent on independent Claim 27. As stated above, Claim 27 is in a condition for allowance. Accordingly, Claims 28-35 are also in a condition for allowance.

Within the Office Action, Claims 36-39 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hulyalkar in view of Ramakrishnan, and further in view of Lee. The Applicant respectfully traverses these rejections.

Claims 36-39 are dependent on independent Claim 27. As stated above, Claim 27 is in a condition for allowance. Accordingly, Claims 36-39 are also in a condition for allowance.

For the reasons given above, Applicant respectfully submits that the claims are in a condition for allowance, and allowance at an early date would be appreciated. Should the Examiner have any questions or comments, the Examiner is encouraged to call the undersigned at (408) 530-9700 to discuss the same so that any outstanding issues can be expeditiously resolved.

Respectfully submitted,
HAVERSTOCK & OWENS LLP

By: 

Thomas B. Haverstock
Reg. No.: 32,571
Attorney for Applicants

Dated: 5-14-04

CERTIFICATE OF MAILING (37 CFR § 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the U.S. Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450

HAVERSTOCK & OWENS LLP.

Date: 5-14-04 By: 